ALGEBRA

C – 13

122. If $p + q + r = 13$ and $pq + qr + rp = 30$, then the value of $p^3 + q^3 + r^3 - 3pqr$ is:

(A) 1125 (B) 1145

(C) 1027 (D) 1216

RRB GROUP-D 2022

$p^3+q^3+r^3-3pqr = (p+q+r)\left[(p+q+r)^2 - 3(pq+qr+rp)\right]$

$= 13\left[169-90\right] = 13 \times 79$

$= \quad 7$

123. If $a + b + c = 16$ and $ab + bc + ca = 78$, Find the value of $a^3 + b^3 + c^3 - 3abc$.

(A) 218
(B) 352
(C) 320
(D) 220

RRB GROUP-D - 2018

$a^3+b^3+c^3-3abc = a+b+c\left[(a+b+c)^2-3(ab+bc+ca)\right]$

$= 16\,[256-234]$

$= 16 \times ___ 2$

$= ___ 2$

$78 \times 3 = 234$

2

124. If $a + b + c = 17, abc = 168$, and $ab + bc + ca = 94$, then $a^3 + b^3 + c^3 = ?$

(A) 621
(B) 623
(C) 620
(D) 622

RRB NTPC 2021

$a^3+b^3+c^3-3abc = 17[289 - 282]$

$= a^3+b^3+c^3-504 = 17 \times 7$

$= 119 + 504$

$= ___3$

125. *If* $a + b + c = 6$ *and* $a^3 + b^3 + c^3 - 3abc = 126$, *then* $ab + bc + ca$ *is equal to:*

(A) 5 (B) 6
(C) 12 (D) 8

SSC CGL 2019

$a^3+b^3+c^3-3abc = (a+b+c)[(a+b+c)^2-3(ab+bc+ca)]$

$126 = 6[36-3x]$

$21 = 36 - 3x$

$-15 = -3x$

$x = 5$ A

$$a^3+b^3+c^3-3abc=\frac{a+b+c}{2}\left[3\left(a^2+b^2+c^2\right)-(a+b+c)^2\right]$$

126. *If* $a + b + c = 9$ *and* $a^2 + b^2 + c^2 = 29$ *then find the value of* $a^3 + b^3 + c^3 - 3abc$.

(A) 9
(B) 27
(C) 3
(D) 81

RRB GROUP-D -2018

$$a^3+b^3+c^3-3abc = \frac{a+b+c}{2}\left[3(a^2+b^2+c^2)-(a+b+c)^2\right]$$

$$= \frac{9}{2}\left[87-81\right]$$

$$= \frac{9}{2} \times 6^{3}$$

$$= 27$$

87

127. If $x + y + z = 6, xyz = -10$ and $x^2 + y^2 + z^2 = 30$, then what is the value of $(x^3 + y^3 + z^3)$?

(A) 132 (B) 135
(C) 130 (D) 127

SSC CGL 2019

$$x^3+y^3+z^3-3xyz = \frac{x+y+z}{2}\left[3(x^2+y^2+z^2)-(x+y+z)^2\right]$$

$$K + 30 = 3[90-36]$$

$$\Rightarrow K = 132$$

128. *If* $a + b + c = 5$, *and* $a^2 + b^2 + c^2 = 33$, *then what is the value of* $a^3 + b^3 + c^3 - 3abc$?

(A) 195

(B) 180

(C) 192

(D) 185

SSC CHSL 2019

$$= \frac{a+b+c}{2}\left[3(a^2+b^2+c^2) - (a+b+c)^2\right]$$

$$= \frac{5}{2}[99 - 25]$$

$$= \frac{5}{2} \times 74^{37}$$

$$= 185$$

A

129. If $x + y + z = 3, x^2 + y^2 + z^2 = 45$ and $x^3 + y^3 + z^3 = 69$, then what is the value of xyz.

(A) -40 ✓

(B) 40

(C) -30

(D) 30

SSC CHSL 2021

$45 \times 3 = 135$

$$x^3+y^3+z^3-3xyz = \frac{x+y+z}{2}\left[3(x^2+y^2+z^2)-(x+y+z)^2\right]$$

$$\Rightarrow 69 - 3K = \frac{3}{2}\left[135 - 9\right]$$

$$\Rightarrow 69 - 3K = \frac{3}{2} \times 126 = 189$$

$$\Rightarrow -3K = 189 - 69 = 120$$

$$-K = 40$$

$$K = -40$$

★ ★

$$a^3+b^3+c^3-3abc=\frac{a+b+c}{2}\left[(a-b)^2+(b-c)^2+(c-a)^2\right]$$

130. If $a = 999, b = 998, c = 997$, then the value of $a^3 + b^3 + c^3 - 3abc$ will be

(A) 8982 (B) 8980
(C) 8983 (D) 8985

WBCS MAINS 2021

$3000 - 6$

$= 3000 - 6$

$a^3 + b^3 + c^3 - 3abc = \frac{a+b+c}{2}\left[(a-b)^2 + (b-c)^2 + (c-a)^2\right]$

$= \frac{2994}{2}\left[1 + 1 + 4\right]$

$= 1497 \times 6 = ____ 2$

131. The value of $a^3 + b^3 + c^3 - 3abc$, when $a = 125$, $b = 127$ and $c = 129$, is:

(A) 3752
(B) 4572
(C) 4752
(D) 4725

SSC CHSL 2020

$$a^3+b^3+c^3-3abc = \frac{a+b+c}{2}\left[(a-b)^2+(b-c)^2+(c-a)^2\right]$$

(*) $a^3+b^3+c^3-3abc=0$

$a^3+b^3+c^3=3abc$

(*) $a=b=c$

(*) $a+b+c=0$

132. If $a + b + c = 0$, then $(a^3 + b^3 + c^3)^2 = ?$

(A) $3a^2b^2c^2$
(B) $9a^2b^2c^2$
(C) 9abc
(D) 27abc

RRB ALP & TEC 2018

$a^3+b^3+c^3 = 3abc$

$(3abc)^2$

$= 9a^2b^2c^2$

133. Select the value which is in the following expression will replace '?'

$If\ a + b + c = 0\ then\ a^3 + b^3 + c^3 = ? \times abc$

3

(A) 1
(B) 4
(C) 3
(D) 2

RRB RPF SI - 2019

134. $x + y + z = 0$, then what will be the value of $\frac{X^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy}$?

(A) 3

(B) $\frac{x^2y^2z^2}{x}$

(C) $\frac{3x^2 3y^2 3z^2}{x}$

(D) $x^2 + y^2 + z^2$

RRB NTPC 2021

$$\frac{x^2}{yz} + \frac{y^2}{zx} + \frac{z^2}{xy}$$

$$\Rightarrow \frac{x^3 + y^3 + z^3}{xyz}$$

$$\Rightarrow \frac{3xyz}{xyz} = 3$$

140. *if* $a + 2b + 3c = 0$, *then what is the value of* $(a^3 + 8b^3 + 27c^3)$?

(A) 18 abc (B) 12 abc

(C) 0 (D) 6 abc

SSC CPO 2024

$3 \times a \times 2b \times 3c$

$= 18abc$

141. *What is the value of* $a^3 + b^3 + c^3$ *if* $(a + b + c) = 0$?

(A) $a^2 + b^2 + c^2 - 3abc$
(B) 0
(C) 3abc
(D) $a^2 + b^2 + c^2 - ab - bc - ca$

SSC CGL 2023